Status of Saginaw Bay Walleye Population and Progress Towards Recovery

March 2006
Michigan Department of Natural Resources
Fisheries Division

Executive Summary

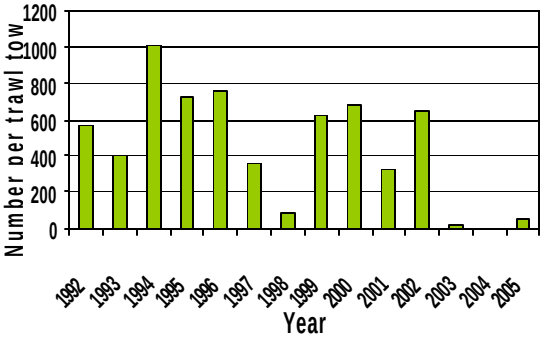
Adult alewives have become very scarce in Lake Huron since 2003. This has caused many profound changes to the fish community of the Lake and in Saginaw Bay. In the Bay, the absence of adult alewives (which are predators on newly hatched walleye fry) has led to greatly increased production of walleye young-of-the-year (YOY). The increases are a result of natural reproduction. Although strong year classes have been created, overall survival of juvenile walleye is lower due to their high density. The Saginaw Bay Walleye Recovery Plan calls for interruptions to stocking when three or more predominantly wild year classes have been created. This level was achieved in 2005. Now the DNR is proposing to not stock the bay in 2006 and instead use fingerling walleye for stocking in inland locations. Further stocking under this current situation is believed to have little or no benefit to the bay's walleye population. The DNR is proposing to continue to monitor the situation and resume stocking if and when adult alewives become abundant again.

The changing ecosystem of Saginaw Bay and its effects on walleye

Many have been hearing about the profound changes taking place in Lake Huron since 2003 with the decline of alewives and the effects on Chinook salmon. The decline of alewives have also had equally profound effects on Saginaw Bay and the walleye population there. These changes have brought about both an opportunity and a need to make changes to how walleye are managed in the bay.

The decline of alewives

Adult alewives use Saginaw Bay as a spawning and nursery ground. This brings the adults into the bay each spring at the same time newly hatched walleye fry are emerging from the rivers. Although the adult alewives are there for spawning, they continue to feed and are believed to impact walleye and other species by feeding on and competing with the fry. One of the reasons walleye stocking has proved useful in the bay over the years is because they are too



Trends in Alewife Abundance in Saginaw Bay.

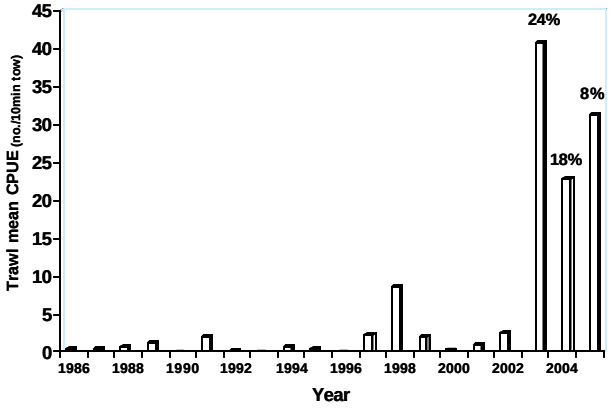
large in size, and late enough in the spring to be vulnerable to predation by alewives.

The abundance of adult alewives in the bay is a function of how many are in Lake Huron. Although this level had fluctuated over the years, there has always been some present. Beginning in 2003, however, adult alewives have become very scarce in Lake Huron and equally scarce in Saginaw Bay during the spring spawning period. This scarcity of adult alewives has created problems for growth of Chinook salmon in Lake Huron. The same scarcity, however, has provided for greatly improved survival of newly hatched walleye fry in the bay.

Recent trends in juvenile walleye production in Saginaw Bay

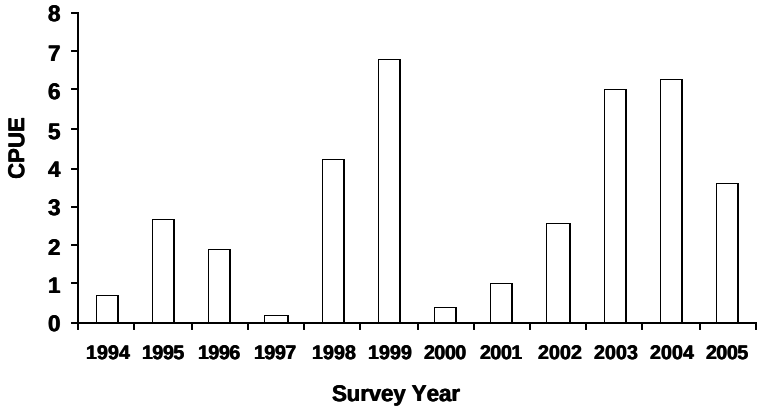
Annual measurements of the abundance of young-of-the-year (YOY) walleye are made in Saginaw Bay by trawling in the fall. Since the decline of adult alewives, the abundance of YOY walleye has increased on average by 21x (by 2100%).

Although walleye stocking has also been increased during this time period, hatchery walleye accounted for only about 20% of this year classes of fish as determined by oxytetracycline (OTC) marking of hatchery fish before stocking. The rest were all a result of wild natural reproduction. This is in contrast to 80% stemming from stocking in the years running up to 2003.



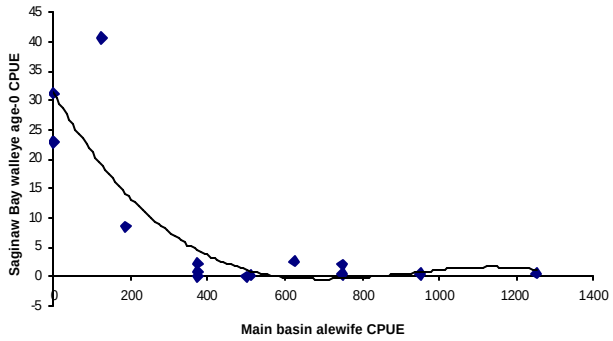
Number of age-0 walleye captured in the Trawl. Percent values represent the proportion of hatchery fish in the trawl.

Despite this enormous increase in YOY production, the recruitment of walleye to the yearling (age-1) stage has not been as great. Although strong year classes are being formed as a result of these recent changes, their overall proportion is not as great as they appear at the YOY stage. This tells us that survival of YOY walleyes (especially over their first winter) is not as great as in the past and is probably a reflection of their new increased abundance (competition effects). Interestingly similar gains in production of YOY yellow perch have also been documented in these same years. Unfortunately they are not surviving as well as the walleye are and benefits to that fishery are less certain.



Yearling Walleye catch per unit effort (CPUE) from Saginaw Bay Gillnet Collections.

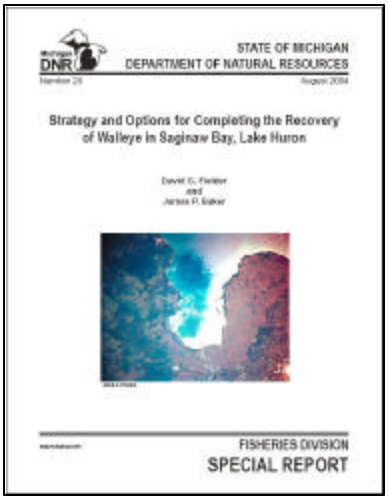
Discoveries and new tools



Relationship between abundance of alewives in the main basin and the number of age-0 walleye produced in Saginaw Bay.

The development of these new record year classes of walleye has been an extraordinary development. Previously, biologists suspected that alewives may have a substantial impact on walleye production and this boom in natural reproduction with the recent scarcity of alewives suggests that they did indeed have a large effect. Furthermore, it appears that Saginaw Bay is still capable of producing large year classes of walleye when alewife are greatly reduced. Biologists have described this new relationship where walleye YOY production is a function of adult alewife abundance in Lake Huron. This curved line relationship indicates that we can predict a strong level of YOY production whenever adult alewife abundance falls below a certain level. This provides a very valuable predictive tool. By using the October catch rate of adult alewives in the annual trawl samples performed by the Great Lakes Science Center in Lake Huron, we can make a prediction about how many YOY walleye will be produced the following spring in Saginaw Bay. Based on this relationship, another year of strong walleye YOY production is predicted for 2006.

Progress towards walleye recovery and management changes



In 2002, the DNR established a plan to promote and complete the recovery of walleye in Saginaw Bay. The goal was to bring the walleye population back to historical abundance, restore predator/prey balance in the bay, and to restore walleye natural reproduction and eliminate the need for stocking. Several strategies were included and several bench marks were established for gauging progress. The recent record years of walleye YOY production represent substantial progress towards these recovery goals although the bay 's walleye population and fishery are not fully recovered yet.

One of the bench marks established was to make a decision about the future role of walleye stocking once wild fish out number stocked fish for three out of five years. That bench mark was reached in 2005. The concern is appropriate in that it is clear that a new bottle neck is at work limiting the amount of yearling walleye that can be produced. Put another way, natural reproduction is saturating the bay's capacity to sustain and produce older walleye. Under this situation, walleye stocking will do little or nothing to generate additional older walleyes and may even compromise the survival of the wild fish. Upon examining this information, and in accordance with the walleye recovery plan, the Fisheries Division of the DNR has proposed to not stock Saginaw Bay in 2006 and instead use the hatchery fish for stocking inland locations.

In addition, the DNR is proposing that decisions about walleye stocking in the bay be made on an annual basis using the alewife prediction equation. Walleye fingerling stocking would still occur in years when adult alewife abundance is predicted to be high but not to be stocked in years when alewife abundance is estimated to be low and hence good walleye natural reproduction is expected. This is a departure from how stocking has been programmed in the past, but the DNR believes that it (1) matches the management practice to the need (only when needed) (2) avails much needed hatchery fish for periodic inland needs (3) follows the tenants of the recovery plan and (4) makes use of recent research findings.

The road ahead

The development of these very strong walleye year classes is very good news for the Saginaw Bay walleye fishery. Anglers have been catching these abundant undersized fish since 2003 and the first ones recruited to the fishery late last summer helping to increase the walleye catch rate in the bay by 22%. Further improvements are expected in the coming years. According to the walleye recovery plan, full walleye recovery in the bay will be achieved when abundance of walleye is great enough to see declines in the overall growth rate of walleye from the current 127% of Michigan average down to 110%. This increase in abundance has not yet been achieved but it now appears that it may be in reach. Full recovery of walleye in Saginaw Bay will someday be one of the great achievements in natural resource stewardship in Michigan. When and if this will occur, however, will likely hinge on what happened to alewives in Lake Huron. Their future is unclear at present. This is why these walleye stocking changes are designed to be flexible and adjust with changes that will likely come in future years.

The report "Strategy and Options for Completing the Recovery of Walleye in Saginaw Bay can be obtained at:

http://www.michigandnr.com/PUBLICATIONS/PDFS/ifr/ifrlibra/special/reports/SR29.pdf

Public comment will be accepted until April 30, 2006. Comments should be sent to:

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